IP Strategies for Solving Conflicts, Speeding Adoption and Rewarding Innovation

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  • Jessica Sullivan

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Agenda

• Intellectual Property has become a valuable and contentious asset in the Advanced Battery Industry

• Drawing upon lessons from other industries, we will address how IP creation and enforcement may affect a burgeoning industry

We will explore:

• Strategies for avoiding battery IP wars in a manner that fosters industry-wide development and growth

• New opportunities for making IP rights widely available while rewarding IP owners for their innovation
What Does the Advanced Battery IP Landscape Look Like?

Advanced Battery & Capacitor PatentEdge™

- Cells
  - Cell Geometry
  - Sealing
  - Hybrid Systems
  - Markets
  - Materials
  - Usage/Lifecycle
    - Grid Storage
      - Algorithms
        - Ancillary Storage
        - Arbitrage
        - Renewable smoothing
      - Lifecycle Management
      - Lifecycle Testing
      - Recycling
    - Safety
      - Contactors/Relays
      - Software
      - Flammability
      - Manual Disconnect
      - Second Life
      - Energy density
  - Electrodes
    - Anodes
      - Carbon
      - Collector Plates
      - Silicon
    - Cathodes
      - Collector Plates
      - Oxides
      - Phosphates
      - Processing
  - Electrolytes
    - Additives
    - Carbonates
    - High-Voltage
    - Ionic Liquids
    - LiPF6
    - Non-Flammable
    - Solid
  - Separators
- Busbars
  - Attachments
  - Configuration
- Cell Balancing
  - Hardware
  - Software
- Covers
- Frames/Modules
  - Assembly
  - Tolerances
  - Interconnects
  - Sealing
- Sense Leads
  - State of Charge
  - State of Health
  - Voltage
- Sensors
  - Embedding
  - Fiberoptics
  - Thermocouples
- Thermal
  - Trays
Battery Patent Trends 2015 - Overview

• Nearly 19,000 battery patents & apps published worldwide ~ 1500 per month

• Overall, 2015 activity grew by 4% from 2014
Battery Patent Trends 2015 - Assignees

- Top 10 assignees account for nearly 1/3 of all patents published in 2015
- Samsung, LG, & Toyota remain the top assignees.
- 70% are US patents
Battery Patent Trends 2015 – Large Cos

• Large companies maintain different geographic filing strategies
Battery Patent Trends 2015 – Large Cos

- Large companies focus filings on different technology areas
Battery Patent Trends 2015 – Large Cos

- Large companies
Battery Patent Trends 2015 – SV Cos

- Silicon Valley companies’ patent filing velocity 2005-2014
- Tesla announces opening its portfolio in June of 2014
Battery Patent Trends 2015 – Notable events

• Toyota offers ~ 6000 fuel cell patents on a royalty free basis
• Unified sets up “Automotive Zone” Toyota, Honda & 20 others join
• Ford subscribes to Intellectual Ventures, RPX and LOTNET
• Hyundai/Kia joined the Open Invention Network Community
• Youxia X unveils a copy cat of the Tesla model S
Li-Ion Electrolyte Patent Assignee Dependency by Citation
Growing Industry + Increasing IP = Litigation

Li-ion Battery Patent Infringement Cases per Year

- 21.2% CAGR between 2002 and 2015

Source: RPX/PatentFreedom

All Li-ion Battery Lawsuits per Year

- 29.4% CAGR between 2002 and 2015
A Few Exemplary Patent Litigation cases:

• **Hydro-Quebec / University of Texas v. A123, Black & Decker, Segway, etc.** - “cathode materials for rechargeable lithium batteries”, 6 patents, 5-6 year litigation battle. Settled in 2011.


• **Milwaukee Electric Tool Corp v. Snap-On, Inc.** - “multi-cell lithium ion batteries in cordless electric tools.” 3 patents, filed ~2002, issued 2011. Settlements with various cordless tool companies.
## Estimated Cost to Li-Ion Battery Industry thru 2020

<table>
<thead>
<tr>
<th></th>
<th>Median Case</th>
<th>90th Percentile</th>
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</thead>
<tbody>
<tr>
<td>Cost per Litigant (1)</td>
<td>$5M</td>
<td>$12M</td>
</tr>
<tr>
<td>Estimated cost 2002 to 2015 (2)</td>
<td>$260M</td>
<td>$624M</td>
</tr>
<tr>
<td>Projected cost for next 5 Years (2016-2020) (3)</td>
<td>$462M</td>
<td>$1108M</td>
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<tr>
<td>Total Cost to 2020</td>
<td>$722M</td>
<td>$1732M</td>
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<td>Including PTAB</td>
<td>$768M</td>
<td>$1800M</td>
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(1) Based on AIPLA 2015 Report of Economic Survey  
(2) 50 cases for Li-ion Battery patent infringement cases and 2 ITC cases  
(3) Using a 17% CAGR and a base of 10 infringement cases started in 2015; excludes PTAB cases
Patent Strategies

• Establish a Patent Program:
  • Encourage Invention Disclosures – rewards
  • Patent Review Committees
  • File early – US is now a First Inventor to File country
  • Have inventors assign their rights in the inventions
  • These steps increase IP ownership certainty
  • Fraction of the cost of Patent Litigation

• Effective Patent Portfolio:
  • “White Space” around core inventions
  • Structure, function, performance across value chain
  • Where are your markets? Making? Using? Selling?

• Competitor Landscape searches.
  • Where is the competition going?
  • Where is the unplowed territory?
Strategies (cont’d.)

• File Blocking Patent Applications: File patents on what your competitors are trying to do.
  • Makes it harder for your competitor to get patents.
    • Publications to create land-mines of prior art.
    • Creates counter-suit / cross-licensing opportunities.

• Patent Pool Strategy
  • Licensing to enable the market and provide ROI to Technology Innovators
  • Note: LFP Licensing AG – IP Licensing effort around LFP cathode technology (est. 2011)
Problems with Thickets

• Complementary blocking IP
• Uncertain Freedom to Practice
• Litigation Risk
• Licensing is expensive and time consuming
• Royalty Stacking
• Uncertainty in Market Adoption
Patent Thicket Perfect Storm
MPEG LA® Licensing Model

“One-to-Many”

“Many-to-One”

MPEG LA® “Many-to-Many” Licensing Model

MPEG LA pioneered modern patent pool licensing
The MPEG-2 digital video standard faced uncertainty around patent licensing, but the transactional efficiency afforded by the MPEG LA® Licensing Model helped make it the most successful standard in consumer electronics history:

- ~ 10 billion devices
- ~ 65 billion video discs
- ~ $5 trillion in product sales
Many IP Aggregating Entities with Different Goals

- Via Licensing (Dolby) – Audio Codecs
- Sisvel – Wireless standards
- Philips – CD, DVD3C
- Samsung – Blue-Ray
- One Blue (Sony, Philips,…) – Blue-Ray
- Intellectual Ventures
- MPHJ Technology Investments

Standards Pools

- Unified Patents
- Lotnet
- RPX

Patent Assertion Entities

Defensive Entities

Librassay (MPEG LA) – Molecular Diagnostics (Technology)
MPEG LA® Licensing Model

• Convenient one-stop licensing alternative that assists licensees with their technology choices
  o Efficient Access
  o Transparency
  o Freedom to operate
  o Reduced litigation risk
  o Predictability in the business planning process
  o Opportunity for a level playing field
  o Reduces Royalty Stacking

• In turn, it enables inventors, research institutions and other technology owners to monetize and speed market adoption of their assets to a worldwide market while substantially reducing the cost of licensing
MPEG LA® Licensing Model

• The solution has become the template
• Today MPEG LA operates licensing programs (around many standards that are among the most successful in consumer electronics history) consisting of some 11,000 patents in 80 countries with some 200 patent holders and 6,000 licensees
• MPEG LA is also working on mass market licensing solutions in molecular diagnostics, oligonucleotide therapeutics, gene editing, medical devices, energy storage and nanotechnology
<table>
<thead>
<tr>
<th>Program</th>
<th>Started with</th>
<th>Currently</th>
<th>Licensees</th>
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<tbody>
<tr>
<td><strong>MPEG-2</strong></td>
<td>8 patent owners 102 patents</td>
<td>27 patent owners 1082 patents in 57 countries 1791 Licensees</td>
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<tr>
<td>Program started in 1997</td>
<td></td>
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<tr>
<td><strong>ATSC</strong></td>
<td>6 patent owners 41 patents</td>
<td>10 patent owners 520 patents in 28 countries 166 Licensees</td>
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<tr>
<td>Program started in 2007</td>
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<tr>
<td><strong>AVC/H.264</strong></td>
<td>14 patent owners 20 patents</td>
<td>37 patent owners 4473 patents in 56 countries 1807 Licensees</td>
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<tr>
<td>a/k/a MPEG-4 part 10</td>
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<td></td>
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<tr>
<td>Program started in 2004</td>
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<tr>
<td><strong>VC-1</strong></td>
<td>16 patent owners 130 patents</td>
<td>21 patent owners 972 patents in 36 countries 356 Licensees</td>
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<tr>
<td>Program started in 2007</td>
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<tr>
<td><strong>MPEG-4 Visual part 2</strong></td>
<td>20 patent owners 77 patents</td>
<td>29 patent owners 1442 patents in 54 countries 1189 Licensees</td>
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<tr>
<td>Program started in 2002</td>
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<tr>
<td><strong>MPEG-2 Systems</strong></td>
<td>8 patent owners 161 patents</td>
<td>10 patent owners 258 patents in 29 countries 242 Licensees</td>
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<tr>
<td>Program started in 2006</td>
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<tr>
<td><strong>IEEE 1394</strong></td>
<td>6 patent owners 8 patents</td>
<td>10 patent owners 275 patents in 22 countries 134 Licensees</td>
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<tr>
<td>Program started in 1999</td>
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<tr>
<td><strong>MVC</strong></td>
<td>15 patent owners 112 patents</td>
<td>19 patent owners 1139 patents in 45 countries 37 Licensees</td>
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<td>Program started in 2012</td>
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<tr>
<td><strong>HEVC</strong></td>
<td>23 patent owners 55 patents</td>
<td>32 patent owners 1260 patents in 55 countries 93 Licensees</td>
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<tr>
<td>Program started Sept. 29, 2014</td>
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<tr>
<td><strong>DisplayPort</strong></td>
<td>4 patent owners 8 patents</td>
<td>5 patent owners 23 patents in 4 countries 19 Licensees</td>
<td></td>
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<tr>
<td>Program started March 5, 2015</td>
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Potential Battery IP Pools

- Cathodes
- Anodes
- Electrolytes
- Separators
- BMS
- Inverters
- Charging
- Safety
- Integration

Licensee
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LFP Joint Licensing Effort (est. 2011)

LiFePO4+C Licensing AG

Sud-Chemie
UT Austin
CNRS
Aleees
Hydro-Quebec
U of Montreal
A123
Sumitomo Cement
Sud-Chemie
A123
BASF
Adv Lith Elec
Mitsui Eng Ship
Mitsui Eng Ship
Sony
Aleees
Tatung
NTT